Table 2. Characteristics of the measurement data set. na, not applicable.

Parameter	Site*	Instrument†	Wavelengths (nm)	Measurement depth and frequency
$\beta(\lambda, 140)$	B	Hobilabs® Hydroscat-2 and −4[1]	442 and 555 442, 488, 550, and 620	1-min measurement sequences at 10 Hz every 15 min, z=9 m.
	P	Hobilabs® Hydroscat-6[2]	442, 470, 510, 589, 671, and 870	Profiling mode, during monthly cruises
$b_p(\lambda)$	B	Wetlabs® AC-9[3]	412, 440, 488, 510, 532, 555, 650, 676, and 715	Profiling mode, during monthly cruises
	P	Wetlabs® AC-9[4]	412, 440, 488, 510, 555, 630, 650, 676, and 715	
$c(\lambda)$	B	Wetlabs® 25-cm path length C-star transmissometer[5]	660	1-min measurement sequences at 6 Hz every 15 min (buoy; z=4 and 9 m), plus profiling mode during monthly cruises
	P	Wetlabs® AC-9[4]	650	Profiling mode, during monthly cruises
Phyto-plankton pigments and [Chl]	B P	HPLC[6] Fluorimetry[7]	na	Water sampling from a 12-bottle rosette, during monthly cruises
$a_p(\lambda)$	B	Perkin-Elmer® Lambda 19[8]	from 350 to 750, 2-nm resolution	Water sampling from a 12-bottle rosette, during monthly cruises
	P	Shimadzu® UV2401-PC (a Perkin-Elmer® Lambda 2 before mid-2003) spectrophotometer[9]	from 190 to 900, 0.1-nm resolution 350–750 used in analysis	

* B, BOUSSOLE; P, PnB.

† Superscripted numerals are defined as follows: 1, Maffione and Dana (1997), Antoine et al. (2006); 2, Maffione and Dana (1997), Kostadinov et al. (2007); 3, Antoine et al. (2006); 4, Kostadinov et al. (2007); 5, Antoine et al. (2006); 6, Ras et al. (2008); 7, Kostadinov et al. (2007); 8, Antoine et al. (2006); 9, Kostadinov et al. (2007).

and where $\beta_w(140)$, the contribution of pure seawater to scattering at 140°, is computed following the method of Zhang et al. (2009) using the temperature and salinity measured at the same depth with a Seabird® SBE-37SI CTD sensor. Before entering into Eq. 4, $\beta(140)$ is corrected for attenuation along the measurement path [the $\sigma(\lambda)$ correction of Maffione and Dana 1997] using the beam attenuation coefficient measured in parallel (*see* later) and the total absorption coefficient derived from inversion of the diffuse attenuation coefficient for downward irradiance (K_d) and the irradiance reflectance (R) (eqs. 12 and 13 in Morel et al. 2006). The median value of this correction is $\sim 1.7 \times 10^{-5}$ m^{-1} sr^{-1} at 555 nm and 5×10^{-5} m^{-1} sr^{-1} at 442 nm. Maximum values of $\sim 5 \times 10^{-4}$ m^{-1} sr^{-1} occur at $\lambda = 442$ nm when [Chl] $\sim$ 3–5 mg m^{-3}. Multiplying the $\beta(140)$ dark current measurements reported above by the 2 $\pi\chi_p$ factor (Eq. 4) gives uncertainties on total b_b of about 1×10^{-4} m^{-1} for $\lambda = 555$ nm and 1.5×10^{-5} m^{-1} for $\lambda =$ 443 nm. These numbers are actually smaller than the noise levels provided by the manufacturer (2×10^{-5} to 2×10^{-4} m^{-1} root mean square error, RMSE). Spectral measurements of the VSF from 0.2° to 178° at a 1° resolution have also been conducted during a single cruise in August of 2004 using the Multispectral Volume Scattering Meter (MVSM) instrument described by Lee and Lewis (2003) and operated as described in Chami et al. (2005). These data were used in complement to the Hydroscat data when analyzing b_{bp} spectral dependence.

A HOBIlabs® Hydroscat-6 backscattering meter (Maffione and Dana 1997) is used on PnB cruises in a profiling mode, with filters at 442, 470, 510, 589, 671, and 870 nm (Table 2). This instrument is pure-water calibrated, either at the factory or at the University of California at Santa Barbara (Kostadinov et al. 2007). The data processing is the same as for the BOUSSOLE measurements, except that the sigma correction is applied using concurrent Wetlabs® absorption and attenuation meter (AC-9) data. Surface backscattering coefficients are determined as the average over the top 15 m. The particle backscattering coefficient at 555 nm is extrapolated from the measurements at 589 nm assuming a λ^{-1} spectral dependency. A large uncertainty of 1 on the exponent would translate only as a 6% uncertainty on $b_{bp}(555)$.

For both data sets, the spectral dependency of b_{bp} is expressed through the slope γ, thus:

$$\gamma = -\frac{\log\lfloor b_{bp}(\lambda_1)/b_{bp}(\lambda_2)\rfloor}{\log[\lambda_1/\lambda_2]} \quad (5)$$

with $\lambda_1 = 442$ nm and $\lambda_2 = 555$ nm for BOUSSOLE or 589 nm for PnB (i.e., the values extrapolated at 555 nm are not used to compute γ). Under the assumptions that the PSD follows a power law and that the particles are nonabsorbing, γ can be used as a proxy of the slope of the particle size distribution (Morel 1973). The assumption of nonabsorbing particles is invalid, however, and the particulate scattering spectrum is depressed by absorption, in particular at 443 nm (Babin et al. 2003). Loisel et al. (2006) demonstrated the feasibility of retrieving γ from space and related its value to ecosystem characteristics and used it to qualitatively describe